Remarks:

The applicants have made minor amendments to claims **11** and **12** to overcome the Examiner's rejections under 35 U.S.C. §112. No new matter is being introduced by thee amendments.

The applicants thank the Examiner for considering all references submitted in the Information Disclosure Statement per duty to disclose of 37 CFR 1.56 with the understanding the it is the IDS filed on 31 March 2004 that is meant and ask that the Examiner confirm this understanding.

The applicants also thank the Examiner for approving the drawings with the understanding that the drawings are those of 8 March 2004.

Rejections under 35 U.S.C. 112

The Examiner rejected claim1 **11** under 35 U.S.C. 112 under the broadest interpretation of "said axis". The amended claim 11 specifies that the axis belongs to the elongate object and thus overcomes this rejection. Claim **12** is amended to be consistent with amended claim **11**.

Novelty Rejections under 35 U.S.C. 102

The Examiner rejected claims **1**, **2**, **4**, **5**, **9**, **10**, **31** and **32** under 35 U.S.C. 102(e) as being anticipated by Sheridan (US Pat. 6,583,869). The applicant respectfully traverses these rejections. For a better understanding, below is a re-statement of claim **1** with bold added for emphasis:

1. An apparatus for determining at least one orientation parameter of **an elongate object having a tip contacting a surface at a contact point**, said apparatus comprising:
   a) **a projector** on said elongate object for illuminating said surface with a **probe radiation in a predetermined pattern from a first point of view;**
   b) a detector on said elongate object for detecting a scattered portion of said probe radiation returning from said surface to a second point of view;

c) a unit for determining said at least one orientation parameter from a difference between said probe radiation and said scattered portion.

Turning to Sheridan and the rejections to claims **1** and **31** note that Sheridan does not teach that the elongate object contacts a plane surface with a tip. In fact, col. 6, lines 21-24 of Sheridan specifically call out the apparatus to be a "non-contact apparatus". There is no teaching about a tip for touching the surface during the measurement, since the object Sheridan refers to is sometimes not even a material object but, e.g., a flame of a welding torch.

Because of the lack of the surface constraint that appears in claims **1** and **31**, Sheridan uses not just one, but three emitters or range finder units and even four in some cases to localize his apparatus based on a triangulation method. The reason Sheridan needs so many emitters (even two would be insufficient) is that without the surface constraint determining orientation is a mathematically complex problem described by six degrees of freedom of rigid body motion (x,y,z and three Euler angles). Note, however, that there would be no purpose for Sheridan to teach a surface contraint, since the purpose for Sheridan's invention is to localize an object and specifically a surface working device, which does not need to be an elongate object, while the device is away from and not in contact with the surface.

In contrast, the apparatus of invention according to present main claims **1** and **31** uses just one projector to measure an orientation parameter of an elongate object whose tip is touching a plane surface. Because of this fundamental difference in the measurement process, claim **1** teaches an entirely different type of measurement from that of Sheridan.

In addition, Sheridan does not teach to mount one projector on the elongate object as claimed by the inventors in claims **1, 31**. In fact, Sheridan has no specific elongate object but instead a surface working, testing or inspection device 1 (see, col. 6, lines 20-21) on which no emitter is ever mounted. Instead, Sheridan teaches to mount <u>three or more range finding units</u> on a base plate (preferably to its outer perimeter and equally spaced - see col. 3, lines 9-11) to which the surface working, testing or inspection device, such as a drill or welding torch is mounted with the aid of a separate means 5 (see col. 6, lines 23-29).

Sheridan also does not teach that the radiation from the projector should be projected in a predetermined pattern. In fact, it appears that using a pattern or a scanned pattern in conjunction with the apparatus and method of Sheridan would be disadvantageous for technical reasons, since signal coordination for the three range finding units that constantly measure different distances due to the pattern or scanning activity would be difficult to use in the vector

computations that are supposed to find the distance and orientation of the surface with respect to the base plate.

For the above reasons and limitations of claims **1**, **31** not taught by Sheridan, the applicants submit main claims **1** and **31** to be novel over Sheridan.

Claim **2** is independently novel because Sheridan does not teach to determine the inclination angle θ to the surface normal at the contact point of the tip of the elongate object that is contacting the surface.

Claim **4** is dependent on claim **1**, shown to be novel over Sheridan and therefore submitted to be novel over Sheridan.

Claim **5** it is independently novel, since there appears no reference to a pattern in Sheridan's Fig. 4, and, as pointed out above, it appears non-feasible for technical reasons that Sheridan should use a pattern at all in the context of distance ranging units.

Claims **9** and **10** are independently novel because Sheridan does not disclose that the object is a jotting implement. There is no basis for drawing this conclusion, since the invention of Sheridan applies especially to welding torches and drills mounted in base plates.

Claim **32** is independently novel because Sheridan does not teach scanning.

Obviousness Rejections under 35 U.S.C. 103

In addition to being novel per above arguements, claims **1**, **2**, **4**, **5**, **9**, **10**, **31** and **32** are unobvious over Sheridan in the sense of 35 U.S.C. 103 because Sheridan lacks any suggestion about how to use a single projector and a detector both mounted on an elongate object whose tip is in contact with a surface to determine at least one of the object's orientation parameters.

The Examiner has rejected claims **3**, **6-8** and **34** under 35 U.S.C. 103(a) as being unpatentable over Sheridan in view of Lange et al. (10/217,945 or U.S. Pat. 6,741,364).

As to claims **3**, **6-8** and **34** taken jointly, the applicants submit that Sheridan and Lange cannot be combined and a person skilled in the art would not be motivated to combine them for technical reasons. Specifically, equipping the surface of Sheridan with target optical elements of Lange does not appear feasible.

Furthermore, each of claims **3**, **6-8** and **34** taken independently are dependent on base claims that have been shown to be novel and unobvious in accordance with 35 U.S.C. 102 & 103 per above arguments.

The applicants thank the Examiner for finding claims **11-30** to be allowable and submit that the amendment presented herein to claims **11, 12** puts these claims in condition for allowance.

The applicants also thank the Examiner for finding claims **35-37** allowed.

Conclusion

In view of the above amendments and arguments, the applicants submit all claims **1-37** have been placed in condition for allowance.

Respectfully submitted,

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